

Abstract Submitted
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An effective method to reduce wall interference in subsonic wind tunnels.¹ NARGES TABATABAEI, RICARDO VINUESA, RAMIS ÖRLÜ, PHILIPP SCHLATTER, SimEx/FLOW, KTH Engineering Mechanics — Wall interference in wind-tunnel tests is known to be one of the main sources of uncertainty in experimental aerodynamics, reducing the accuracy and fidelity of the measurements. Even low-blockage-ratio test sections require a wall correction if a faithful representation of free-flight conditions is intended. This problem is investigated via Reynolds-averaged Navier–Stokes (RANS) simulations for a range of angles of attack. The simulations are validated with Large Eddy Simulation (LES) and experimental wind-tunnel data. The isolated aerodynamics effect of confinement is analyzed beside the boundary layer growth effect. A simple and efficient yet effective method is proposed to design wall inserts, capable of correcting the wall interference in subsonic wind tunnels with moderate blockage ratio. In this method, we propose the use of linear inserts to account for the effect of the wind-tunnel walls. The use of these inserts leads to very good agreement between free-flight and wind-tunnel data, while this approach benefits from simple manufacturing and experimental-deployment processes. Wind-tunnel experiments with the proposed insert design for validation purpose are currently underway.

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